Center Innovation Fund: GSFC CIF

Graphene Field Effect Transistors for Radiation Detection

Completed Technology Project (2013 - 2014)

Project Introduction

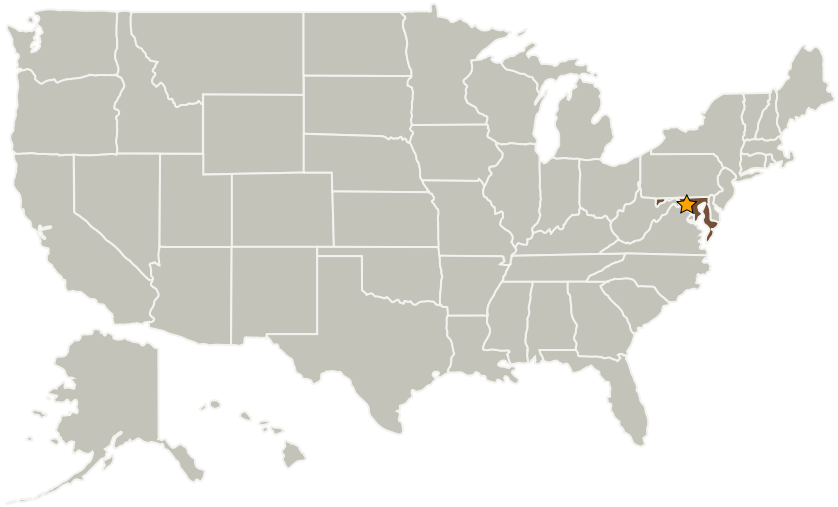
This is propose to develop Graphene Field Effect Transistor based Radiation Sensors (GFET-RS) for NASA Manned Spaceflight Missions anticipated in next several decades.

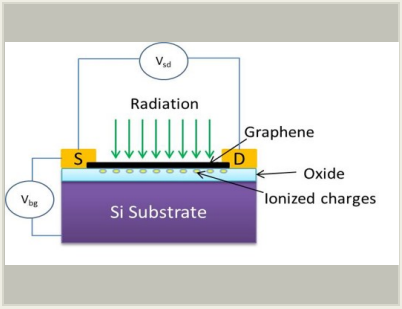
The device consists of a graphene piece deposited on a Si substrate with certain thickness of insulation layer. In our initial experiment, constant radiation was applied above the GFET and device conductance was measured before and after the radiation. We observed an increase of the device mobility (transconductance) after the radiation. This demonstration showed that graphene is radiation hard and its conductance changes with radiation. With the IRAD fund, we will continue exploring sensing mechanisms in GFETs and identify optimal absorber substrates and device geometries to improve radiation detection speed, sensitivity, and energy resolution of our GFET-RS devices.

Anticipated Benefits

The ultimate goal is to develop a new class of portable, high-sensitivity radiation sensors that can be carried by crew members in future manned flight missions.

Primary U.S. Work Locations and Key Partners





Graphene FET Radiation Sensor

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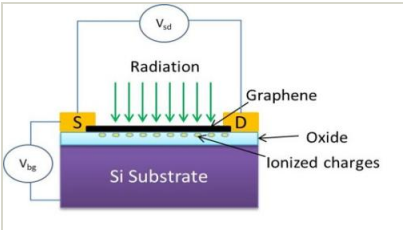
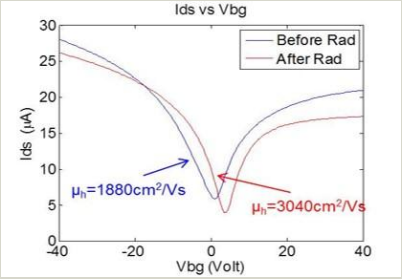
Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations
Maryland

Images



Graphene Field Effect Transistors for Radiation Detection Project
Graphene FET Radiation Sensor
(https://techport.nasa.gov/image/4084)



Graphene Field Effect Transistors for Radiation Detection Project
Drain current response to Gamma radiation
(https://techport.nasa.gov/image/4085)

Project Website:

http://sciences.gsfc.nasa.gov/sed/

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Center / Facility:
Goddard Space Flight Center (GSFC)

Responsible Program:
Center Innovation Fund: GSFC CIF

Project Management

Program Director:
Michael R Lapointe

Program Manager:
Peter M Hughes

Project Manager:
Terence A Doiron

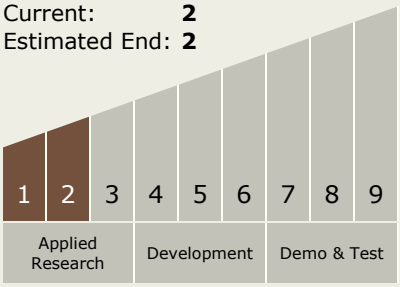
Principal Investigator:
Mary J Li

Graphene Field Effect Transistors for Radiation Detection

Completed Technology Project (2013 - 2014)

Technology Maturity (TRL)

Start: **1**
Current: **2**
Estimated End: **2**



Technology Areas

Primary:

- TX13 Ground, Test, and Surface Systems
  - TX13.2 Test and Qualification
    - TX13.2.2 Propulsion, Exhaust, and Propellant Management